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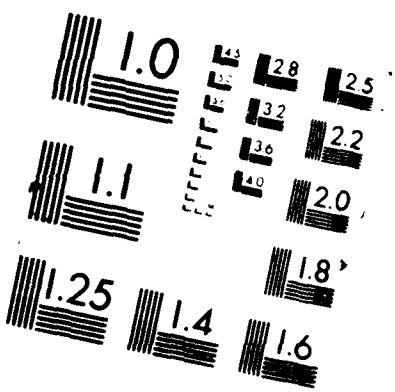
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This University Research Instrumentation Program (URIP) grant was used to purchased Sun 3 workstations to enchance the development of image processing facilities at the University of Florida. Several image processing research projects have made use of this equipment including the following topic: (1) image processing language development, (2) target distance measurement, (3) image complexity measures and their use in selection of optimum edge detection algorithms, and (4) global dataflow analysis optimization for image processing programs.

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AFOSR-86-0258 Equipment Grant Final Status Report

Grant number AFOSR-86-0258 was awarded in June 1986 in the amount of $100,000. These funds were given to support the development of image processing laboratory facilities at the University. In November 1986, a purchase order was issued for the following items:

Item	Cost
Sun 3/280 Workstation with 8 MBytes main memory 1600 bpi tape drive 575 MBytes disk storage	$71,480
Sun 3/110C Workstation 4 MBytes main memory 19" color screen	$15,920
Sun 3/110LC Workstation 4 MBytes main memory 15" color screen	$12,153
Total Expenditure	$99,553

This equipment was received during December of 1986 and January of 1987, and was put into operation immediately along together with two Sun 3/110LC workstations and a Sun 253 add-on color monitor and keyboard purchased with matching funds from the University of Florida. University matching funds were also used to buy several peripheral hardware items including a Dunn Multicolor film output device, a Datacube A/D converter and three-frame framestore, and two dual-to-triple width VME bus converters. To support software development, the university purchased the Verdix Ada Development System from matching funds as well.

Since the arrival of this equipment several research projects having to do with image processing have been carried out using equipment described above as the primary facility. The next few paragraphs describe each of these projects separately.

Image Processing Language Development

Gerhard X. Ritter, Joseph N. Wilson, J. Davidson, K. Perry, D.C. Wilson

The past decade has witnessed vast increases in image processing and pattern recognition activities. The utilization of image processing architectures and techniques in such diverse areas as medicine, robotics, geophysics, space exploration, and military applications has resulted in a deluge of different notation, operations and algorithms that all too often perform similar or identical tasks. The establishment of a rigorous common mathematical structure for image processing is, therefore, highly disirable. The Department of Defense has supported a variety of research efforts aimed at establishing the foundations of such a structure. The aim of this research is the full development of this structure.

Source of Funds: United States Air Force, Defense Advanced Research Project Agency

Target Distance Measurement
Gerhard X. Ritter, Wei Zhang, Simon Lu

Mapping a 3-dimensional scene onto an image plane is a many-to-one transformation. That is, an image point does not uniquely determine the location of the corresponding world point. The missing depth information can be obtained by using stereoscopic imaging techniques. The goal of this research effort is to use stereo geometry and state-of-the-art image processing technology to estimate the distance between image points and their corresponding "real world" points.

Source of Funds: A.C. Nielsen Inc.

Image Complexity Measures and Their Use in Selection of Optimum Edge Detection Algorithms
Gerhard X. Ritter and Jennifer L. Davidson

Currently there exists no algorithm that employs surface complexity structure in conjunction with statistical image measures in selecting parameters which can be used in the selection of an optimum edge detector algorithm for a given image. The rationale for classifying edge detectors and using the classification scheme to specify and evaluate image measures is to develop a method which in principle could be implemented in an automated target recognition system. The immediate goal of this research is to produce a set of image measures that will aid in determining which edge detector provides optimum results on a particular image.

Source of Funds: Air Force Office of Scientific Research

Global Dataflow Analysis Optimization for Image Processing Programs
Joseph N. Wilson, Gerhard X. Ritter, L.A. White

Programs written in high-level languages often display inefficiencies in implementation that can be removed via application of global dataflow analysis based optimizations. These optimizations make use of information about the flow of data through programs to restructure programs to improve either execution efficiency or code size. Image processing application programs typically display many inefficiencies causing both execution and code size problems. Many of these inefficiencies can be avoided through the use of existing global dataflow analysis techniques, others cannot. The goal of this project is to identify new global dataflow analysis optimization techniques suited to improving efficiency of programs written for image processing. Several new techniques have been developed and are being studied for possible inclusion in an optimizing compiler for an image processing language.

Source of Funds: University of Florida Quality Improvement Fund.

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